

a third light transmission window disposed over said linear electronic image detection array.--

--265. A micro-imaging device comprising: a PLIIM-based semiconductor chip mounted on a mechanically oscillating scanning element in order to sweep both the FOV of a linear image detection array and coplanar planar laser illumination beam (PLIB) through a 3-D volume of space in which objects bearing bar code and other machine-readable indicia may pass.--

--266. A PLIIM-based semiconductor chip comprising a plurality of linear SEL arrays which are electronically-activated to electro-optically scan (i.e. illuminate) the entire 3-D FOV of a ELECTRONIC image detection array without using mechanical scanning mechanisms.--

--267. A PLIIM-based semiconductor chip comprising:

a miniature 2-D camera having a 2-D array of SEL diodes arranged about a centrally located 2-D area-type ELECTRONIC image detection array, said 2-D array of SEL diodes and 2-D area-type ELECTRONIC image detection array are both mounted on a semiconductor substrate;

a IC package for encapsulating said 2-D array of SEL diodes and said 2-D area-type ELECTRONIC image detection array, and having

a centrally-located light transmission window positioned over said 2-D area-type ELECTRONIC image detection array, and

a peripheral light transmission window positioned over said 2-D array of SEL diodes surrounding said centrally located 2-D area-type ELECTRONIC image detection array.--

--268. The PLIIM-based semiconductor chip of claim 267, wherein a light focusing lens element is aligned with and mounted over said centrally-located light transmission window to define a 3-D field of view (FOV) for forming images on said 2-D area-type ELECTRONIC image detection array, whereas a 2-D array of cylindrical lens elements is aligned with and mounted over said peripheral light transmission window to substantially planarize laser emission from said linear SEL arrays (comprising the 2-D SEL array) during operation.--

--269. The PLIIM-based semiconductor chip of claim 268, wherein each cylindrical lens element is spatially aligned with a row (or column) in said 2-D area-type ELECTRONIC image detection array, and each linear array of SELs in said 2-D array of SEL diodes, over which a cylindrical lens element is mounted, is electrically addressable (i.e. activatable) by laser diode control and drive circuits.--

--270. The PLIIM-based semiconductor chip of claim 269, wherein said laser diode control and drive circuits are fabricated on said semiconductor substrate.--

--271. The PLIIM-based semiconductor chip of claim 269, wherein said 2-D area-type ELECTRONIC image detection array has a 3-D field of view (FOV), and said 2-D array of SEL diodes enables the illumination of an object residing within said 3D FOV during illumination operations, and the formation of an image strip on the corresponding rows (or columns) of detector elements in said 2-D area-type ELECTRONIC image detection array.--

--272. A method of fabricating a planar laser illumination and imaging module (PLIIM) comprising the steps of:

mounting a pair of micro-sized cylindrical lens arrays upon a pair of linear arrays of surface emitting lasers (SELs) formed between a linear ELECTRONIC image detection array on a common semiconductor substrate.--

--273. A planar laser illumination and imaging module (PLIIM) realized on a semiconductor chip, comprising:

a linear ELECTRONIC image detection array having image formation optics providing a field of view (FOV);

a pair of micro-sized cylindrical lens arrays mounted upon a pair of linear arrays of surface emitting lasers (SELs) fabricated on opposite sides of said linear ELECTRONIC image detection array, so as to produce a composite planar laser illumination beam (PLIB) which is aligned with said FOV in a coplanar manner;

said linear ELECTRONIC image detection array and said linear SEL arrays being formed a common semiconductor substrate, and encased within an integrated circuit (IC) package having electrical connector pins for establishing interconnections with a host system; and

first and second elongated light transmission windows disposed over said pair of linear arrays of SELs; and

a third light transmission window disposed over said linear ELECTRONIC image detection array.--

--274. The PLIIM-based chip of claim 273, wherein said micro-sized cylindrical lens arrays are fabricated from either diffractive or refractive optical material.--

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--275. The PLIIM of claim 273, wherein said pair of linear arrays of SELs and said linear ELECTRONIC image detection array are arranged in optical isolation of each other to avoid light leaking onto said linear ELECTRONIC image detector from within said IC package.--

--276. The PLIIM-based chip of claim 273, mounted on a mechanically oscillating scanning element in order to sweep both said FOV and coplanar PLIB through a 3-D volume of space in which objects bearing bar code and/or other machine-readable indicia or graphical intelligence may pass. --

--277. A planar laser illumination and imaging module (PLIIM) comprising: a 2-D array of surface emitting lasers (SELs) disposed about a 2-D area-type ELECTRONIC image detection array on a common semiconductor substrate, with a field of view defining lens element mounted over the 2-D ELECTRONIC image detection array and a 2-D array of cylindrical lens elements mounted over the 2-D array of SELs.--

REQUIREMENT UNDER 37 C.F.R. 1.121

As required under 37 C.F.R. 1.121 a clean version of the first paragraph of Page 1 of the Specification is as follows:

This is a Continuation of Application No. 09/954,477 filed September 17, 2001, which is a Continuation-in-Part of: copending Application Serial No. 09/721,885 filed November 24, 2000; International Application PCT/US00/15624 filed June 7, 2000, published as WIPO Publication WO 00/75856; Application Serial No. 09/327,756 filed June 7, 1999; each said application being commonly owned by Assignee, Metrologic Instruments, Inc., of Blackwood, New Jersey, and incorporated herein by reference as if fully set forth herein.

09/954,477

Also as required under 37 C.F.R. 1.121, a clean set of the amended Claims is as follows:

263. A planar laser illumination and imaging module (PLIIM) realized on a semiconductor chip comprising: a pair of micro-sized (diffractive or refractive) cylindrical lens arrays mounted upon a pair of large linear arrays of surface emitting lasers (SELs) fabricated on opposite sides of a linear ELECTRONIC image detection array.

264. A PLIIM-based semiconductor chip comprising:

a pair of linear SEL arrays for producing a composite planar laser illumination beam;

a linear ELECTRONIC image detection array having field of view (FOV) arranged in a coplanar relationship with said composite planar laser illumination beam, wherein said linear ELECTRONIC image detection array and said pair of linear SEL arrays are each formed a common semiconductor substrate so that said linear ELECTRONIC image detection array is arranged between said pair of linear SEL arrays; and

an integrated circuit package encasing said linear ELECTRONIC image detection array and said pair of linear SEL arrays, said integrated circuit package having

electrical connector pins for connected to a host system,

first and second elongated light transmission windows disposed over said pair of linear SEL arrays so that said composite planar laser illumination beam , and

a third light transmission window disposed over said linear ELECTRONIC image detection array.

265. A micro-imaging device comprising: a PLIIM-based semiconductor chip mounted on a mechanically oscillating scanning element in order to sweep both the FOV of a linear image detection array and coplanar planar laser illumination beam (PLIB) through a 3-D volume of space in which objects bearing bar code and other machine-readable indicia may pass.

266. A PLIIM-based semiconductor chip comprising a plurality of linear SEL arrays which are electronically-activated to electro-optically scan (i.e. illuminate) the entire 3-D FOV of a ELECTRONIC image detection array without using mechanical scanning mechanisms.

267. A PLIIM-based semiconductor chip comprising:

a miniature 2-D camera having a 2-D array of SEL diodes arranged about a centrally located 2-D area-type ELECTRONIC image detection array, said 2-D array of SEL diodes and

2-D area-type ELECTRONIC image detection array are both mounted on a semiconductor substrate;

a IC package for encapsulating said 2-D array of SEL diodes and said 2-D area-type ELECTRONIC image detection array, and having

a centrally-located light transmission window positioned over said 2-D area-type ELECTRONIC image detection array, and

a peripheral light transmission window positioned over said 2-D array of SEL diodes surrounding said centrally located 2-D area-type ELECTRONIC image detection array.

268. The PLIIM-based semiconductor chip of claim 267, wherein a light focusing lens element is aligned with and mounted over said centrally-located light transmission window to define a 3-D field of view (FOV) for forming images on said 2-D area-type ELECTRONIC image detection array, whereas a 2-D array of cylindrical lens elements is aligned with and mounted over said peripheral light transmission window to substantially planarize laser emission from said linear SEL arrays (comprising the 2-D SEL array) during operation.

269. The PLIIM-based semiconductor chip of claim 268, wherein each cylindrical lens element is spatially aligned with a row (or column) in said 2-D area-type ELECTRONIC image detection array, and each linear array of SELs in said 2-D array of SEL diodes, over which a cylindrical lens element is mounted, is electrically addressable (i.e. activatable) by laser diode control and drive circuits.

270. The PLIIM-based semiconductor chip of claim 269, wherein said laser diode control and drive circuits are fabricated on said semiconductor substrate.

271. The PLIIM-based semiconductor chip of claim 269, wherein said 2-D area-type ELECTRONIC image detection array has a 3-D field of view (FOV), and said 2-D array of SEL diodes enables the illumination of an object residing within said 3D FOV during illumination operations, and the formation of an image strip on the corresponding rows (or columns) of detector elements in said 2-D area-type ELECTRONIC image detection array.

272. A method of fabricating a planar laser illumination and imaging module (PLIIM) comprising the steps of:

mounting a pair of micro-sized cylindrical lens arrays upon a pair of linear arrays of surface emitting lasers (SELs) formed between a linear ELECTRONIC image detection array on a common semiconductor substrate.

273. A planar laser illumination and imaging module (PLIIM) realized on a semiconductor chip, comprising:

a linear ELECTRONIC image detection array having image formation optics providing a field of view (FOV);

a pair of micro-sized cylindrical lens arrays mounted upon a pair of linear arrays of surface emitting lasers (SELs) fabricated on opposite sides of said linear ELECTRONIC image detection array, so as to produce a composite planar laser illumination beam (PLIB) which is aligned with said FOV in a coplanar manner;

said linear ELECTRONIC image detection array and said linear SEL arrays being formed a common semiconductor substrate, and encased within an integrated circuit (IC) package having electrical connector pins for establishing interconnections with a host system; and

first and second elongated light transmission windows disposed over said pair of linear arrays of SELs; and

a third light transmission window disposed over said linear ELECTRONIC image detection array.

274. The PLIIM-based chip of claim 273, wherein said micro-sized cylindrical lens arrays are fabricated from either diffractive or refractive optical material.

275. The PLIIM of claim 273, wherein said pair of linear arrays of SELs and said linear ELECTRONIC image detection array are arranged in optical isolation of each other to avoid light leaking onto said linear ELECTRONIC image detector from within said IC package.

276. The PLIIM-based chip of claim 273, mounted on a mechanically oscillating scanning element in order to sweep both said FOV and coplanar PLIB through a 3-D volume of space in which objects bearing bar code and/or other machine-readable indicia or graphical intelligence may pass.

277. A planar laser illumination and imaging module (PLIIM) comprising: a 2-D array of surface emitting lasers (SELs) disposed about a 2-D area-type ELECTRONIC image detection array on a common semiconductor substrate, with a field of view defining lens element mounted over the 2-D ELECTRONIC image detection array and a 2-D array of cylindrical lens elements mounted over the 2-D array of SELs.